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IDENTIFICATION OF GEOSTRUCTURES OF CONTINENTAL CRUST PARTICULARLY AS
THEY RELATE TO MINERAL RESOURCE EVALUATION

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Prepared for:

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<p>4. Title and Subtitle</p> <p>IDENTIFICATION OF GEOSTRUCTURES OF CONTINENTAL CRUST PARTICULARLY AS THEY RELATE TO MINERAL RESOURCE EVALUATION (SR 180)</p>		<p>5. Report Date</p> <p>1 January 1973</p>
<p>7. Author(s)</p> <p>George Gryc and Ernest H. Lathram (IN 387)</p>		<p>6. Performing Organization Code</p>
<p>9. Performing Organization Name and Address</p> <p>U. S. Geological Survey 345 Middlefield Rd. Menlo Park, Calif. 94025</p>		<p>8. Performing Organization Rept. No.</p>
<p>12. Sponsoring Agency Name and Address</p> <p>Edward W. Crump Goddard Space Flight Center Greenbelt, Maryland 20771</p>		<p>10. Project/Task/Work Unit No.</p>
<p>15. Supplementary Notes</p>		<p>11. Contract/Grant No.</p> <p>S-70243-AG</p>
<p>16. Abstracts</p> <p>In a precursory study, the location of mineralized areas in Alaska was found to be crudely related to the northwest- and northeast-trending set of possible crustal fractures first observed on the Nimbus IV IDCS March 29, 1971 image, occurring along or between possible crustal structures in a manner similar to the location of mineralized areas in western Canada.</p> <p>In the western DeLong Mountains, I. L. Tailleux found that Band 5 images show clearly the distribution of limestone of the Lisburne Group, delimiting stacked thrust plates soled by the limestone, whereas Band 7 images show better the distribution of ultramafic rocks. Elsewhere, features previously unrecognized on aerial photos or in field mapping were identified--the extension of a known and the location of an unknown fault in the Alaska Range by D. H. Richter, a closely-spaced set of northeast-trending fractures in the Alatna Hills possibly related to the west-trending Kobuk fault zone by W. W. Patton, Jr., and an east-trending lineation expressed in generally north-oriented Arctic Coastal Plain lakes by W. A. Fischer. The east-trending lineation in lakes parallels deflections in contours of gravity and magnetic fields, and westward deflections in northwest-trending folds to the south, and may reflect concealed unknown structures.</p>		<p>13. Type of Report & Period Covered</p> <p>Type II Progress Rept. 1 Jul 72- 31 Dec 72</p>
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Type II Progress Report
ERTS-A

- a. Title: Identification of Geostuctures of Continental Crust
Particularly as They Relate to Mineral Resource Evaluation

ERTS-A Proposal No.: SR 180

- b. GSFC ID No. of P.I.: IN 387

- c. Statement and explanation of any problems that are impeding the progress of the investigation:

None, except that about 10% of the images furnished are too dense, particularly in those of bands 4 and 5, to permit identification and interpretation of features in lowland areas.

- d. Discussion of the accomplishments during the reporting period and those planned for the next reporting period:

All images received have been indexed and cursorily looked over. Preliminary examination of selected images of Northern Alaska has been accomplished by Co-P.I. and Alaskan Branch geologists expert in the area. Results were reported in Type I reports for periods ending Sept. 1 and Nov. 1, 1972, and are summarized in the abstract on Standard Title Page of this report. Subsequent to Nov. 1, study of an additional northern Alaska image resulted in the significant result reported in item e. below.

Images of central and southern Alaska have been distributed to geologists expert in these areas. During the next reporting period, study of these and images of the rest of Alaska by experts and Co-P.I. is planned.

In addition, a standing order change will be requested to provide imagery for the months May, June and July, missed by the late launch of ERTS-1, and hopefully full coverage of the state by < 30% cloud cover images. This is now about 70% complete. This change will also permit the beginning of color-enhancement study of color or vegetal signatures related to lithologic facies or structure on ERTS-1 images and will establish baseline parameters for comparison with ERTS-B imagery.

Publication of an in-depth discussion of the result reported in item e. in a technical journal is planned; the manuscript is now in preparation. Other publications are planned in the next reporting period as results dictate.

e. Discussion of significant scientific results:

Lakes in the Arctic Coastal Plain of Alaska are dominantly elongate, with their long axes parallel and trending about N 9° W. On ERTS-1 image 1004-21395, William A. Fischer noted an additional strong east-trending regional lineation, not previously recognized on aerial photographs or in field study, expressed by elongation of some lakes, alignment of others, and by linear interlake areas. In addition, the alignment of many small lakes forms a large and a small ellipse superimposed on the regional lineation. Fischer and E. H. Lathram find that the trend of this lineation is parallel to the trend of deflections in contours of the magnetic and gravity fields in the area, and parallel to westerly deflections in the northwest ends of northwest-trending folds mapped to the south. These data suggest that heretofore unsuspected structures may be concealed beneath Quaternary mantling sediments in the area of the image. The strata in these folds would be younger than those tapped by the oil wells of the Umiat field to the south, and favorable sandstone facies may occur in the area. The significance of these observations to oil exploration in northern Alaska needs to be evaluated further.

Category 4K.

f. A listing of published articles, and/or papers, preprints, in-house reports, abstracts of talks, that were released during the reporting period:

Gryc, George, and Lathram, E. H., 1972, Identification of geostructures of continental crust, particularly as they relate to mineral resource evaluation: U.S. Dept. Commerce, Natl. Tech. Inf. Service, NASA-CR-128144, 4 p.

Lathram, E. H., and Gryc, George, (in press), Metallogenic significance of Alaskan geostructures seen from space: Eighth Internat. Symposium on Remote Sensing of Environment, Ann Arbor, Michigan, Oct. 1972, Proc.

Lathram, E. H., (in press), Metallogenic significance of Alaskan geostructures seen on Nimbus and ERTS images: Internat. Conference on Remote Sensing in Arid Lands, Tucson, Arizona, Nov. 1972, Proc.

Gryc, George, and Lathram, E. H., 1972, Identification of geostructures of continental crust, particularly as they relate to mineral resource evaluation: Type I Progress Report to NASA, Period Sept. 1 to Nov. 1, 1972.

Lathram, E. H., 1972, EROS Program and ERTS imagery: Invited talk given to Northern California Geological Society, San Francisco, California.

g. Recommendation concerning practical changes in operations, additional investigative effort, correlation of effort and/or results as related to a maximum utilization of the ERTS system:

None, other than suggestion that negatives be less densely printed, as mentioned in previous reports.

h. A listing of date of any changes in Standing Order Forms:

None.

i. ERTS Image Descriptor forms:

None.

j. Listing by date of any changed Data Request forms submitted to Goddard Space Flight Center/NDPF during the reporting period:

None.